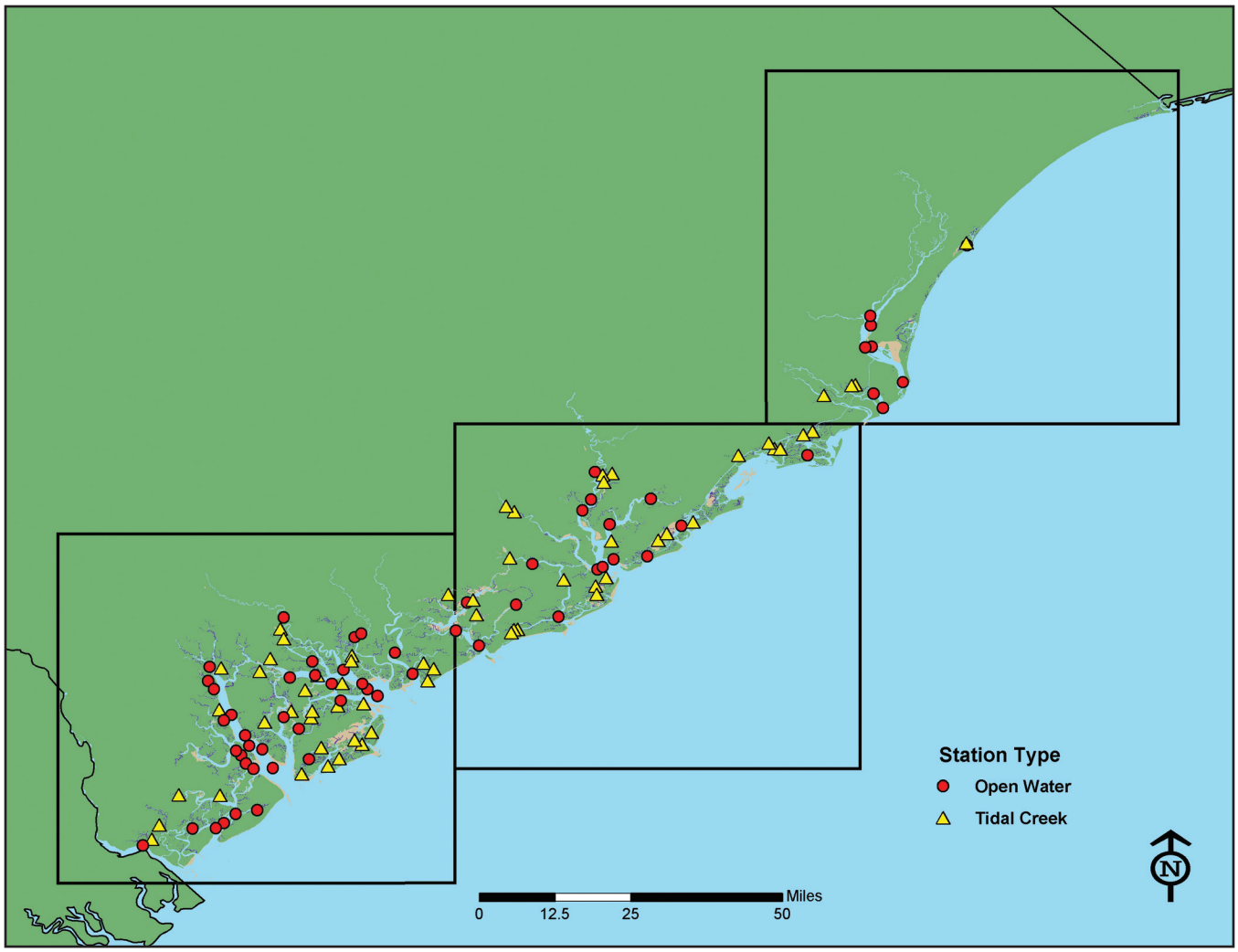


*Figure 3.1.1. Distribution of open water and tidal creek stations sampled throughout South Carolina's coastal zone during 2003 - 2004 with northern, central and southern geographic regions outlined.*

Average depth of the tidal creek sites was 2.5 m and varied from approximately 0.3 to 6.1 m. Only one site was substantially less than the 1 m minimum criteria due to unusual tidal conditions. Average depths and ranges were comparable to the previous survey periods (Van Dolah *et al*., 2002a, 2004a).

### 3.2. Water Quality

Although instantaneous measures of basic water quality variables (temperature, salinity, dissolved oxygen, pH) were obtained during the primary visit to each site, the continuous measures of these parameters from the 25-hr instrument deployments provide the most comprehensive information because they include numerous measures during both day and night over two complete tidal cycles. Therefore, these data are used as the primary data set in our analyses of these four water quality parameters. The other measures of water quality (total and dissolved nutrients, $BOD_5$, TSS, turbidity, TOC, total alkalinity, chlorophyll-*a*, and fecal coliform bacteria) obtained at each site represent instantaneous measures collected during the primary site visit.

State regulations 61-68 and 61-69 have been developed to protect the water quality of the state (SCDHEC, 2004). The water quality standards include numeric and narrative criteria that are used for setting permit limits on discharges to waters of the state, with

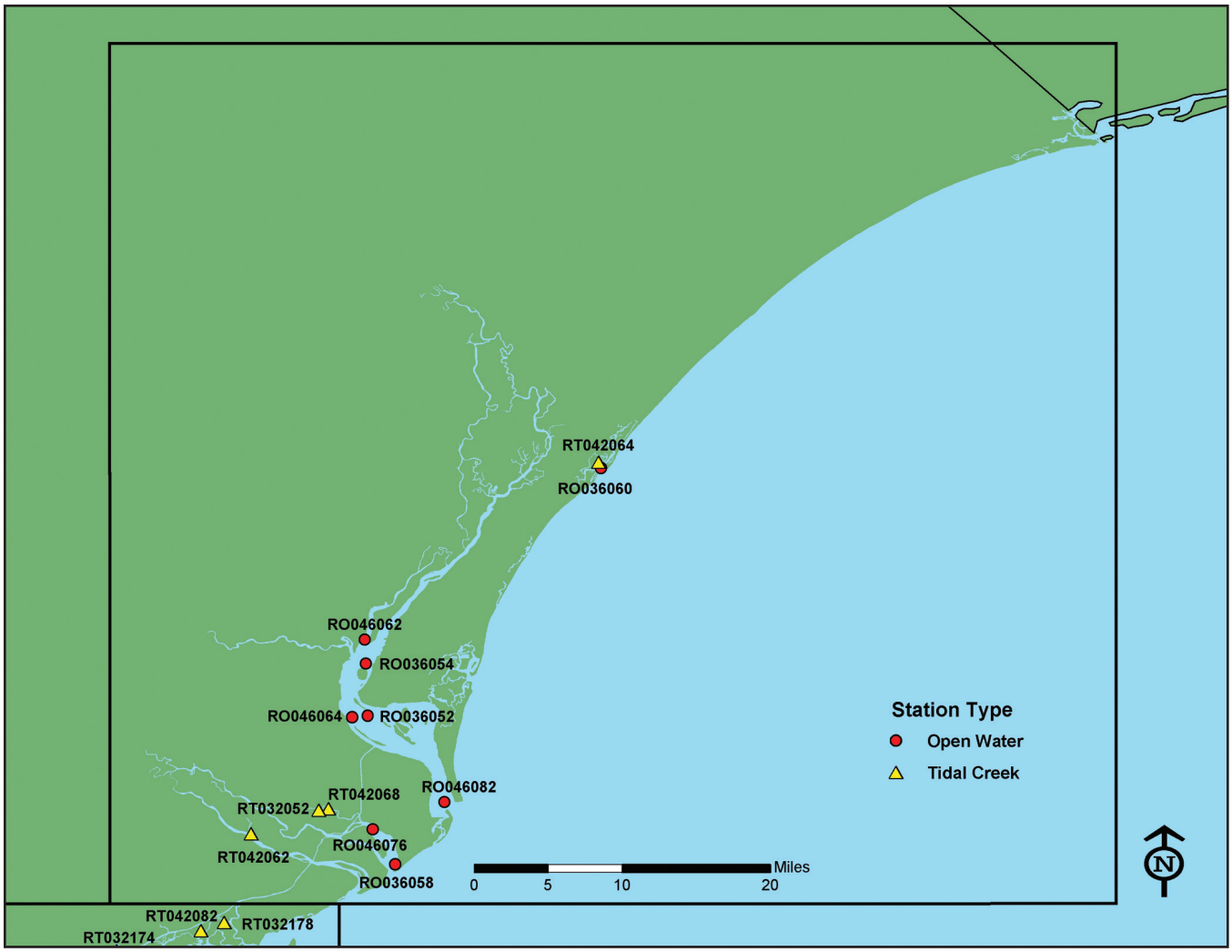


*Figure 3.1.2. Distribution of open water and tidal creek stations sampled in the northern portion of the state during 2003 - 2004.*

the intent of maintaining and improving surface waters "to a level to provide for the survival and propagation of a balanced indigenous aquatic community of flora and fauna and to provide for recreation in and on the water." Occasional short-term departures from these conditions will not automatically result in adverse effects to the biological community. The standards also recognize that deviations from these criteria may occur solely due to natural conditions and that the aquatic community is adapted to such conditions. In such circumstances, the variations do not represent standards violations, and critical conditions of the natural situation, e.g., low flow, high temperature, minimum dissolved oxygen, etc., are used as the basis of permit limits.

All data collected by SCECAP from field observations and water samples are related to water quality standards for the state's saltwater regions (SCDHEC, 2004) where possible. Because SCECAP samples are limited to a summer index period and generally do not include multiple samples over time, the summertime-only data are not appropriate for use in USEPA 303(d) or 305(b) reporting requirements. Additionally, only four water quality parameters have state water quality standards (dissolved oxygen, pH, turbidity, fecal coliform bacteria). For other parameters measured by SCECAP, values are compared to data compiled for a five-year period (1993-1997) by the SCDHEC Bureau of Water in their routine statewide Fixed Ambient Surface Water Monitoring Network

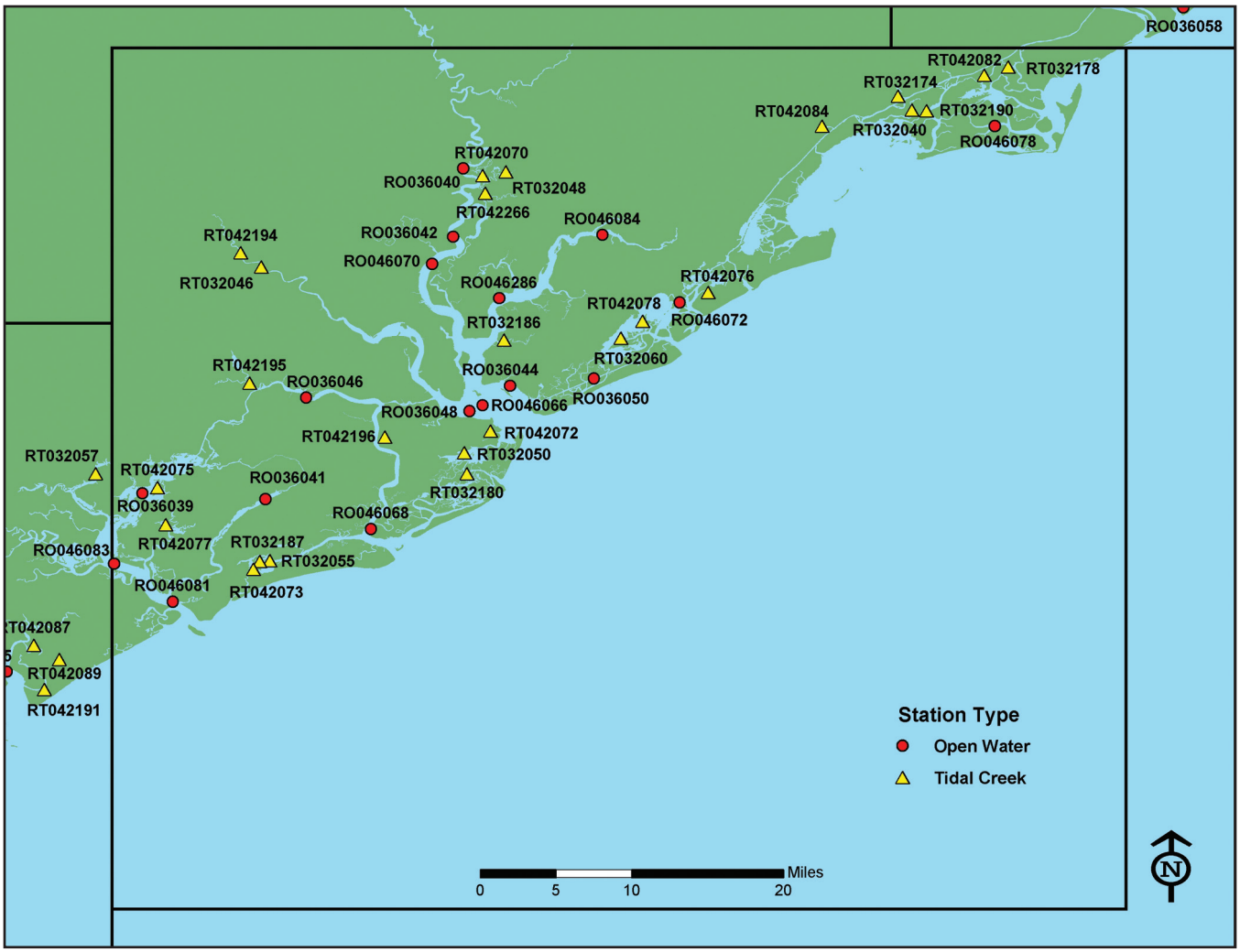


*Figure 3.1.3. Distribution of open water and tidal creek stations sampled in the central portion of the state during 2003 – 2004.*

(SCDHEC, 1998a). SCECAP criteria consider any value less than the 75th percentile of all 1993-1997 historical values measured (≥ method detection limit) in the state's saltwater habitats as evidence of normal (good) condition. Values exceeding the 75th percentile of the historical data are considered to be elevated (fair), and values exceeding the 90th percentile of all saltwater measures indicate high (poor) concentrations. The SCDHEC historical database on water quality was primarily obtained from larger open water bodies. Therefore, caution should be used in interpreting data obtained from tidal creek sites since high or low values observed for some parameters may represent "normal" conditions. Box 3.2.1 compares the 1993-1997 historical data to both the open water and tidal creek data collected from 1999-2004 by SCECAP. For some water quality variables, such as dissolved nutrients and chlorophyll-*a*, criteria or guidelines published in other reports are used for comparison of conditions (e.g. Bricker *et al*., 1999; USEPA, 2004) since no appropriate historical data were available for South Carolina.

SCECAP collects many water quality variables that are either required for the NCA Program or for SCDHEC's assessment of state water quality condition for USEPA 303(d) or 305(b) reporting purposes. This technical report summarizes salinity and all water quality parameters that are used for the integrated measure of overall water quality. This report does not summarize temperature, TOC, $BOD_5$, dissolved nutrients, and alkalinity. Temperature data are primarily collected to relate with other water

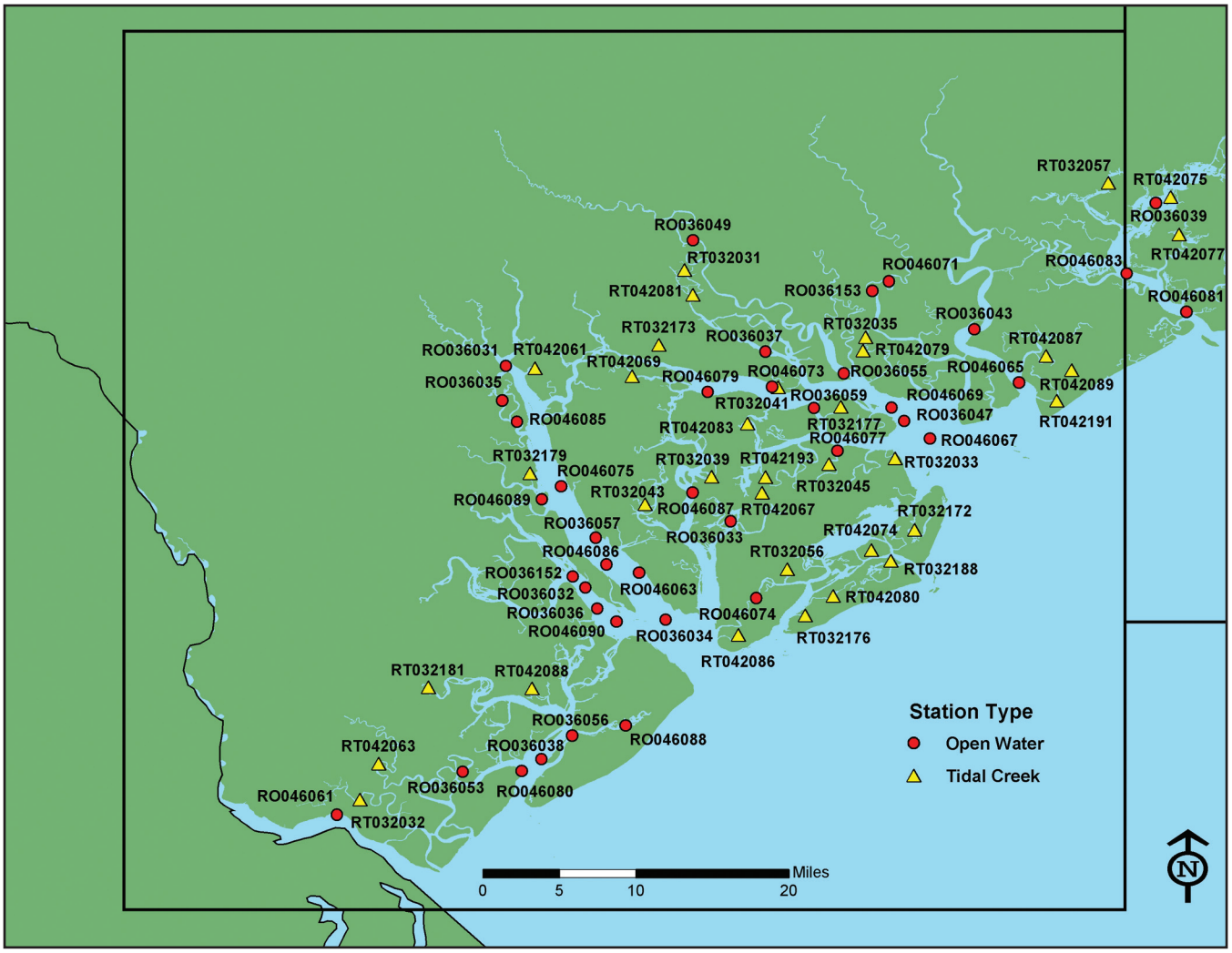


*Figure 3.1.4. Distribution of open water and tidal creek stations sampled in the southern portion of the state during 2003 – 2004.*

quality variables affected by this parameter. The other excluded parameters have no state standards for estuarine waters. Data on all parameters, reported or not, are provided on the SCECAP web site for those interested in acquiring the data.

### *Salinity*

Salinity influences the distribution and diversity of many invertebrate and fish species and can be stressful to many organisms when large variations occur over short time periods. Mean bottom salinities of all sites sampled during the 2003-2004 survey were 23.5 ppt and 24.2 ppt in the tidal creek and open water habitats, respectively. This difference was not statistically significant ($p = 0.998$), but both means were lower than those observed in the previous two surveys conducted in 1999-2000 and 2001-2002. Additionally, the percentage of the state's estuarine waters that were considered to be oligohaline ($\leq$ 5 ppt) or mesohaline (> 5 to < 18 ppt) was 28% and 29% for tidal creeks and open water habitat, respectively, compared to < 11% for either habitat in the previous two surveys (Figure 3.2.1). This reflects the effects of increased rainfall following a four year record drought. While greater rainfall might be expected to increase the mean range of salinities observed at the sites sampled over a 25-hr period, this was not observed. The average salinity ranges observed were 4.2 ppt among the tidal creek sites and 6.8 ppt among the open water sites, which were similar to the average ranges observed in previous survey periods (data online). However, three tidal creek sites (RT032178,